



US005956154A

**United States Patent** [19]  
**Cairo**[11] **Patent Number:** **5,956,154**  
[45] **Date of Patent:** **Sep. 21, 1999**[54] **CERTIFIED FACSIMILE**[75] **Inventor:** **Jerry Cairo, Chicago, Ill.**[73] **Assignee:** **Matthew J. Cairo, Plant City, Fla.**[21] **Appl. No.:** **08/560,170**[22] **Filed:** **Nov. 17, 1995**

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**Related U.S. Application Data**

[63] Continuation of application No. 08/310,737, Sep. 22, 1994, abandoned.

[51] **Int. Cl.<sup>6</sup>** ..... **H04N 1/00**[52] **U.S. Cl.** ..... **358/434; 358/405; 358/440; 379/100**[58] **Field of Search** ..... 358/400, 405, 358/434, 442, 468, 435, 436, 437, 438, 439, 440, 401, 402, 403, 404; 379/100, 93, 96, 97, 98, 201, 213, 214; 370/61[56] **References Cited****U.S. PATENT DOCUMENTS**

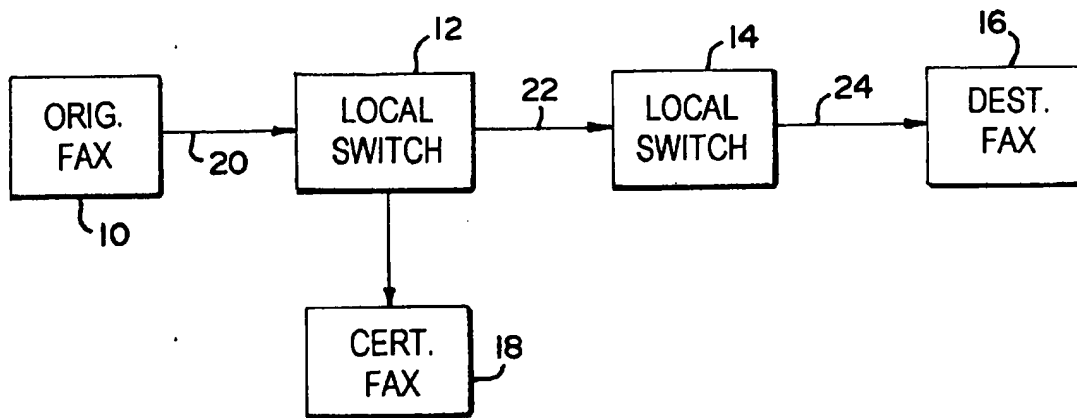
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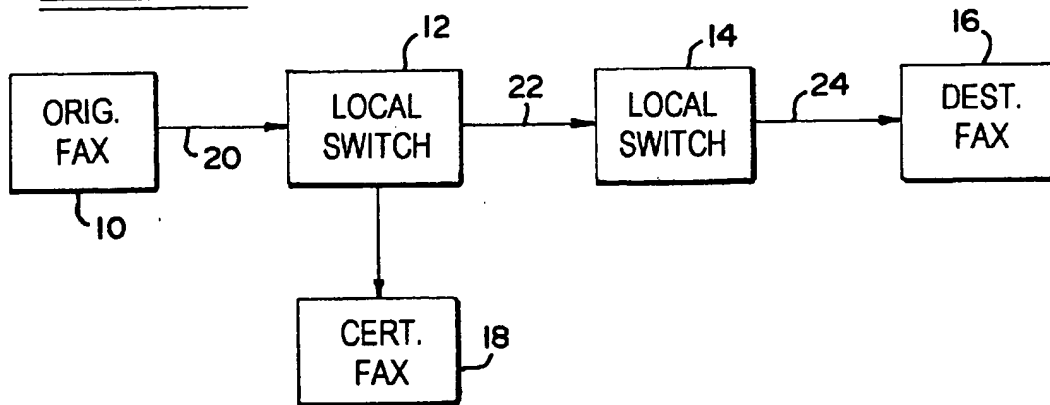
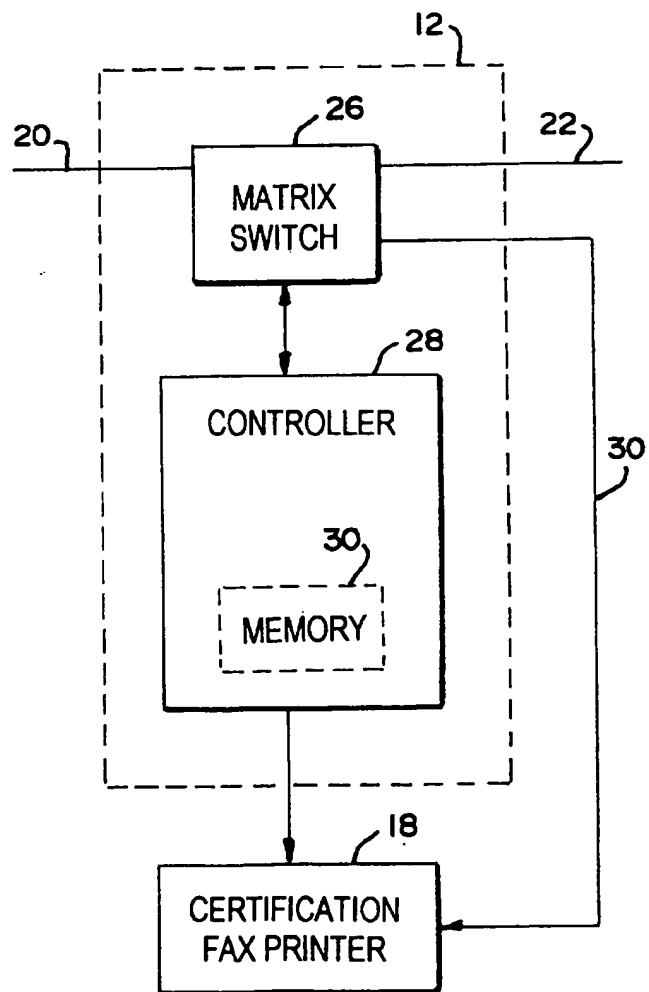
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A method and apparatus is offered of certifying delivery of a facsimile transmission. The method includes the steps of detecting a facsimile transmission from an originating facsimile machine to a destination facsimile machine. The method further includes the steps of receiving acknowledgement from the destination facsimile machine that a page of the facsimile transmission was received and certifying delivery of the page by outputting a copy of the page with indicia of delivery printed thereon.

**17 Claims, 1 Drawing Sheet**

**FIG. 1****FIG. 2**

**CERTIFIED FACSIMILE**

This application is a continuation of application Ser. No. 08/310,737, filed Sep. 22, 1994, now abandoned.

**FIELD OF THE INVENTION**

The field of the invention relates to facsimile machines and in particular to a means of certifying a facsimile transmission.

**BACKGROUND**

Facsimile (fax) machines and the fax transmissions originating from such machines are known. Such machines are typically used to transfer printed and graphical information over great distances via a public switch telephone network (PSTN).

Within a fax machine the printed or graphical information is typically converted into an electrical signal using an optical scanner. A sheet of paper containing the printed or graphical information is fed into a set of transport devices (e.g. rollers) within the fax machines which transports the sheet of paper past the optical scanner. The scanner rapidly scans the width of the sheet transverse to a direction of movement as the sheet is transported past the scanner. A modem within the fax machines converts the electrical signal from the optical scanner into a variable frequency, electrical signal typically in the audio range, for transmission through the PSTN.

At a fax receiver the variable frequency signal is converted into a variable direct current (DC) voltage which is then used to electrostatically dispose a darkening agent (toner) on a received fax sheet in such a manner as to recreate the image detected by the scanner at the transmitting fax machines. The toner is then fixed to the sheet by the application of heat, or otherwise, to complete the process.

To initiate a fax transmission an operator enters a destination telephone number of the fax transmission and loads the material to be faxed into a paper tray on the transmitting fax machine. The transmitting fax then scans the faxed material into a memory in anticipation of transmission. Once the material to be faxed is loaded into memory, the transmitting fax machine seizes an interconnected telephone line and transmits the destination telephone number to a controller within the PSTN. The PSTN controller through a number of local and remote telephone switches, interconnects the calling fax to a target fax. A local PSTN controller notifies the target fax of the incoming call by causing a telephone associated with the target fax machine to ring. The target fax detects the electrical pulses of the ringing, seizes the telephone line and establishes a connection with the transmitting fax machine. The faxed information is then transferred from the transmitting to target fax machine. Upon completion of a transmission, a fax report is printed by the transmitting fax machine listing, inter alia, a target telephone number and number of pages transmitted.

While existing fax machines work well, the prior art has taught that a fax machine can not be relied upon where proof of delivery is required such as for notification of consumer product safety hazards or certain types of court documents. Where proof of delivery is required the prior art has taught that the only alternative is certified U.S. Mail or hand delivery. Because of the importance of certifying delivery of such documents a need exists for a method of certifying fax transmissions.

**OBJECTS AND SUMMARY OF THE INVENTION**

Accordingly, a primary object of the present invention is to provide a method for using existing telephone apparatus

and equipment, but in an arrangement to enable the sending of electronic certified or registered fax transmissions instead of the use of mailing systems for such purposes.

A further and more particular object of this present invention is to provide the steps of a telephone "certified" or "registered" transmission system which enables the telephone number of the recipient of the fax to be recorded along with the time and date of the call and the contents of the fax transmission itself.

A further and more specific object of the present invention is to enable the transmission of a record of the fax transmission to the initiator of the call.

These and other objects of the present invention are provided in a method and apparatus of the present invention of certifying delivery of a facsimile transmission. The method includes the steps of detecting a facsimile transmission from an originating fax machine to a destination facsimile machine, receiving acknowledgement from the destination facsimile machine that a page of the facsimile transmission was received, and certifying delivery of the page by outputting a copy of the page of the facsimile transmission with indicia of delivery printed thereon.

**BRIEF DESCRIPTION OF THE DRAWINGS**

FIG. 1 is a block diagram showing transmitting and receiving facsimile machines interconnected through a telephone network having facsimile certification apparatus in accordance with an embodiment of this invention; and

FIG. 2 is a block diagram of a local telephone switch and interconnected facsimile certification apparatus in accordance with an embodiment of this invention.

**BRIEF DESCRIPTION OF A PREFERRED EMBODIMENT**

The solution to the problem of certifying fax deliveries lies conceptually in interconnecting a fax printer for certification of fax transmissions (certification fax receiver) with a local telephone switch of the PSTN and printing a copy of each page of the fax transmission along with an indicia of delivery. The indicia of delivery may include a telephone number of a destination fax machine, an indication that the faxed sheet was properly delivered, and a time of document delivery.

An originating fax machine may request fax delivery certification by a particular sequence of dialed digits. For example, a controller of a local switch of the PSTN could be programmed to recognize that where a character on a touch tone phone such as a "#" were pressed twice followed by a telephone number of a destination fax machine, that such sequence is to be interpreted as a request for fax delivery certification.

The controller of the local switch upon receiving the request for fax delivery certification would strip off the first two characters (##) and thereafter handle call routing between the originating and destination fax machine as under the prior art. One difference, however, is that the certification fax receiver would be added to the call connection under a technique similar to three-party calling.

The indicia of delivery of a fax transmission is information readily available to the controller of the local switch. The telephone number of the destination fax machine is received by the local switch controller during call set-up and is retained in memory of the local switch controller. Time and date are also available within the local switch controller as part of call billing facilities. The acknowledgement of

receipt of a page of a fax transmission, on the other hand, is something that the local switch controller obtains by monitoring the fax transmission.

During a fax transmission, the originating fax transmits information one line at a time until an end of page is encountered at which time the receiving fax machine acknowledges receipt of the page, or the originating fax re-transmits the page. Under an embodiment of the invention, the local switch controller monitors the fax transmission for page receipt acknowledgements. Upon receipt of a page acknowledgement the certification fax receiver prints the indicia of delivery on a locally printed reproduction of the fax page thereby certifying delivery of the fax page.

FIG. 1 is a block diagram of a PSTN system showing the fax certification feature in accordance with an embodiment of the invention. As shown, an originating fax 10 is provided with a telephone interconnect 20 between the originating fax 10 and a local switch 12 of the PSTN. A destination fax 16 may be interconnected directly to the same local switch 12 as the originating fax 10 or be interconnected through a second local switch 14 as shown in FIG. 1.

It is to be understood that local switches 12, 14 of a PSTN each have a number of telephone interconnects 20, 24 depending on the size of the local switch 12, 14 and the number of local subscribers 10, 16 in the geographic area of each local switch 12, 14. It is also to be understood that local switches 12, 14 of a PSTN are interconnected through a number of trunk groups were the trunk groups provide a means of exchanging communicated information between a first local switch and other local switches in other geographic areas. FIG. 1, in specific, shows a first local switch 12 in a first geographic area interconnected with a second local switch 14 in a second geographic area through a particular trunk group 22.

Each trunk group 22 is made up of a number of communication channels that, within an integrated services digital network (ISDN), may range from a basic rate interface (BRI) (with very few channels and fairly low capacity) to the larger T1 lines with capacities in excess of one Megabits per second. If local switches 12, 14 were of a fairly low capacity, then the interconnecting trunk group 22 may be made up of one or more BRIs where each BRI consists of 2-B channels (typically used for the exchange of subscriber traffic information at a rate of 64 kilo bits per second per channel) and 1-D channel (used for the exchange of control information between switches at a rate of 15 kilo bits).

FIG. 2 is a block diagram of the local switch 12 and fax certification printer 18 of FIG. 1. As shown, the local switch 12 has a matrix switch 26 and local switch controller 28. During normal operation of the PSTN the local switch controller 28 periodically monitors local telephone interconnect 20 for call requests. Upon receipt of a call request, the controller 28 by reference to a called number received from the originating fax machine 10 on a telephone interconnect 20 determines by reference to a memory 30 that the target of the call request (destination fax 16) may be accessed through a particular trunk group 22 and local switch 14. To establish a connection between the originating fax machine 10 and destination fax machine 16 the local switch 12 of the originating fax machine 10 (requesting switch 12) seizes a D channel of the trunk group 22 and transmits an access request to the local switch 14 of the destination fax machine 16 (destination switch 14). If the destination fax 16 is not occupied by a prior call (telephone interconnect 24 busy) and a subscriber traffic channel (B channel) between the requesting switch 12 and destination switch 14 is available,

then the destination switch 14 responds by transmitting an access grant back to the requesting switch 12 identifying an allocated traffic channel to be used during the fax transmission. The destination switch 14 also signals the destination fax 16 of the incoming call. When the destination fax 16 answers the call, switch 14 connects telephone interconnect 24 with the identified traffic channel of the trunk group 22.

The controller 28 of the requesting switch 12, in response to the access grant and to the destination fax answering the call, directs the matrix switch 26 to provide a connection between the allocated traffic channel of the trunk group 22 and the telephone interconnect 20 of the originating fax 10.

Immediately after answering the call, the destination fax 16 begins transmitting a connect tone. When the end-to-end connection of the duplex channel between the originating fax 10 and destination fax 16 is completed, the originating fax 10 answers the connect tone and a negotiation of fax transmission protocol and transmission baud rate follows. Following completion of set-up of originating fax 10 and destination fax 16, the transmission of the fax message may begin.

Where the call request received from the originating fax 10 contains a request for fax certification, the controller 28 of the requesting switch 12 also instructs the matrix switch 26 to provide a three-party connection among the telephone interconnect 20 of the originating fax 10, the allocated traffic channel of the trunk group 22 and the interconnect 30 of the certification fax 18. During fax set-up the certification fax 18 by monitoring the exchange between the originating fax 10 and destination fax 16 is set up substantially the same as the destination fax 16.

Interconnect 30, under the invention, is in the nature of a simplex connection allowing one-way transmission of fax data to the certification fax. The certification fax is not allowed to request a re-transmission of lost data from the originating fax 10.

Since the certification fax does not participate in the negotiation of fax protocol or speed and since the certification fax must accommodate the capabilities of originating and destination fax machines, the certification fax may be of a somewhat greater level of sophistication than the originating or destination fax machines. In all other regards, the certification fax may be selected from any of a range of commercially available fax machines.

Under an embodiment of the invention, provisions are made to avoid printing the indicia of delivery on top of the contents of each page of the fax transmission. Under such an embodiment an oversize paper tray (e.g., for 17 inch by 23 inch paper) is used to supply the certification fax. The oversize supply sheet is queued in a normal manner with the information of each page of the fax transmission printed at the top of the oversized sheet within the certification fax machine. At the output end of the certification fax machine an appropriate printer (e.g. a laser printer) is provided for printing the indicia of delivery on the bottom of each oversized sheet. Together, the certification fax machine and certification printer comprise a certification fax printer 18 providing a degree of reliability of delivery of fax transmissions not available from other sources.

The certification printer is programmed in a known manner to print the indicia of delivery in a non-interfering location of the printed document certifying fax delivery. The indicia of delivery are transferred to the certification printer from the local switch controller 28 via an appropriate data interface (e.g., RS232 or a LAN). Functioning as a connection analyzer, the controller 28 may provide the indicia of

delivery such as the telephone number of the destination fax 16 based upon the destination telephone number included in the original access request, or may query the destination switch 14 over an appropriate D channel of the trunk group 22 after each page of the fax transmission to determine where that page of the fax transmission was sent for purposes of providing additional certainty in the verification process.

Following completion of the documents certifying the delivery of a fax transmission, copies of the document may be sent via regular mail to the originating fax operator, with the original documents held in secure storage. Holding the original documents in an area of secure storage allows for a greater reliability against alteration. Such a method also allows for a fax certification system operator to later offer testimony in a court of law, or otherwise, as to the methods used in certification and to the reliability of such services.

In another embodiment of the invention, the certification fax machine and certification printer are combined into one device. Under such an embodiment a page of fax material is compressed in size to occupy  $\frac{3}{4}$  of a standard size fax page with indicia of delivery occupying the remaining  $\frac{1}{4}$  of the fax. Data delivery to the certification fax under the embodiment is accomplished through use of a data buffer in series with the interconnect 30 and with a data switch interposed between the buffer and certification fax under the control of the controller 28. During transmission of a page of fax information the controller 28 instructs the data switch to pass fax information from the buffer to the certification fax. When the controller 28 detects an end-of-page message from the originating fax 10 and a page acknowledge message from the destination fax 16, the controller 28 instructs the data switch to interrupt the transfer of data from the buffer to the certification fax and, instead, pass indicia of delivery from an output of the controller 26 while the buffer accumulates any new data from succeeding fax pages. Once the data switch transfers the indicia of delivery from the controller 28 to the certification fax followed by a locally generated end-of-page, which indicia is printed on the bottom quarter of the fax page, the controller 28 again instructs the data switch to pass data from the buffer.

In another embodiment of the invention, the fax transmission is not printed immediately with indicia of delivery associated with each page but, rather, the entire fax transmission is stored as a common file with indicia associated with the entire file stored in conjunction with the file as a composite file. As with above embodiments, the composite file is stored in a secure facility with a single summary page printed after creation of the composite file and sent to the operator of the originating fax machine for record keeping purposes. Should a need arise for proof of delivery, the entire composite file is printed upon demand.

In another embodiment, the invention is extended to electronic mail (E-mail) systems operating upon PSTN. Under the embodiment the controller 28 of the switch 12 detects the request for such transmission through identifying digits using in conjunction with a target address. An E-mail printer associated with the switch 12 monitors the transmission through a three-party connection. As above, indicia of delivery are printed on a copy of the E-mail message (preferably in a different color).

Under another embodiment of the invention, a composite file is generated and stored within the originating fax machine as a read-only file using well-known programming techniques. The read-only file is generated using a randomly generated access code known only to the originating fax

machine and which machine allows for printing of the composite file with indicia on each page or in summary form or, alternatively, allows for deletion of the entire file under operator control.

What is claimed is:

1. A method of certifying delivery of a facsimile transmission comprising the steps of:

locating a certification facsimile printer in a secure location remote from either an originating or a destination facsimile machine;

transmitting a certification request from the originating facsimile machine to a controller of a local switch of a public switch telephone network;

detecting a facsimile transmission by the controllers from the originating facsimile machine to the destination facsimile machine;

receiving acknowledgement by the controller from the destination facsimile machine that a page of the facsimile transmission was received; and

certifying delivery of the page by the controller in response to the acknowledgement by outputting a copy of the page with indicia of delivery printed thereon from the printer within the secure facility.

2. The method of claim 1 further comprising the step of including a telephone number of the destination facsimile machine among the indicia of delivery.

3. The method of claim 1 further comprising the step of including a time and date among the indicia of delivery.

4. The method as in claim 1 further comprising the steps of transmitting a certification request from the originating facsimile machine to a controller within a local switch of a public switch telephone network and monitoring a telephone interconnect between the originating facsimile machine and the local switch by the controller of the local switch for a telephone number of the destination facsimile machine.

5. The method as in claim 4 further comprising the step of providing a signal path between the originating facsimile machine and destination facsimile machine by the controller of the local switch.

6. The method as in claim 5 further comprising the step of providing an interconnect between the signal path and a certification facsimile printer.

7. The method as in claim 1 further comprising the step of printing the certification copy at the originating facsimile machine.

8. An apparatus for certifying delivery of a facsimile transmission comprising:

means located within a controller of a local public service telephone network switch for detecting a facsimile transmission from an originating facsimile machine to a destination facsimile machine;

means within the controller for receiving acknowledgement from the destination facsimile machine that a page of the facsimile transmission was received; and

means located within a secure facility remote from the originating and destination facsimile machines for certifying delivery of the page by outputting a copy of the page with indicia of delivery printed thereon.

9. The apparatus of claim 8 further comprising means for including a telephone number of the destination facsimile machine among the indicia of delivery.

10. The apparatus of claim 8 further comprising means for including a time and date among the indicia of delivery.

11. The apparatus as in claim 8 further comprising means for transmitting a certification request from the originating facsimile machine to the controller of local switch of the public service telephone network.

12. The apparatus as in claim 11 further means for monitoring a telephone interconnect between the originating facsimile machine and the local switch by the controller of the local switch for a telephone number of the destination facsimile machine.

13. The apparatus as in claim 12 further comprising means for providing a signal path between the originating facsimile machine and destination facsimile machine by the controller of the local switch.

14. The apparatus as in claim 13 further comprising means for providing an interconnect between the signal path and a certification facsimile printer.

15. The apparatus as in claim 8 further comprising means for printing the certification copy at the originating facsimile machine.

16. An apparatus for certifying delivery of a facsimile transmission comprising:

- a comparator operably connected with a local telephone switch for identifying a certification request from a sending facsimile machine;
- a connection analyzer operably connected with the telephone switch for identifying a receiving facsimile machine upon detection of a certification request by the comparator;
- a controller for establishing a three party connection among the sending facsimile machine, the identified receiving facsimile machine and a printer output upon detection of a certification request;
- a secure facility remote from either the sending or receiving facsimile machines and,
- a printer located in the secure facility connected to the printer output of the three party connection, for repro-

ducing the facsimile transmission along with indicia of delivery including an identity of the sending facsimile machine, the identified receiving facsimile machine, and a time of delivery.

17. An apparatus located within a public switched telephone network for certifying delivery of a facsimile transmission comprising:

- a comparator located within the public switched telephone network and operably connected with a local telephone switch for identifying a certification request from a sending facsimile machine;
- a connection analyzer located within the public switched telephone network and operably connected with the local telephone switch for identifying a receiving facsimile machine upon detection of a certification request by the comparator;
- a controller within the local telephone switch for establishing a simultaneous three party connection within the local telephone switch among the sending facsimile machine, the identified receiving facsimile machine and a memory output upon detection of a certification request;
- a secure facility remote from either the sending or receiving facsimile machines and,
- a memory located in the secure facility connected to the memory output of the three party connection, for storing the facsimile transmission for later printing along with indicia of delivery including an identity of the sending facsimile machine, the identified receiving facsimile machine, and a time of delivery.

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